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EXTINGUISHER

The present invention relates to an extinguisher for fighting fire and incipient explosions, the extinguisher including at least one rupture diaphragm, which seals an extinguishing-agent vessel and has a rupture joint.

To fight fire and suppress incipient explosions which are caused by flour dust, coal dust, or solvent vapors, one normally uses vessels that are filled with an extinguishing agent (usually extinguishing powder) and are permanently under pressure. In an emergency, these blow the extinguishing agent through a quick-opening valve, into the space where extinguishing is required.

An extinguisher for fighting incipient explosions is described by DE 195 44 399 C2, where a tubular extinguishing-agent vessel is sealed on the inside and outside by flat rupture diaphragms. In the interior chamber adjacent to the inner rupture diaphragm, a compressed-gas generator is provided whose generated propellant gas ruptures the diaphragms and then expels the extinguishing agent. This extinguisher does not often achieve good results, since the rupture diaphragms seldom burst open in the center, or in an axially symmetric manner. Instead, the diaphragms rupture at a point outside their center, which causes the expelled extinguishing agent to be dispersed in a considerably asymmetric manner. However, it is necessary to expel all of the extinguishing agent in a uniform manner, in order to attain an optimum spray pattern and, thus, success in extinguishing.

In addition, DE 42 24 184 A1 describes an extinguisher, where the extinguishing-agent vessel is sealed on the outside by a convex rupture diaphragm, which is provided with circular and radial rupture joints. This diaphragm already opens at a pressure of 0.1 to 1.0 bar above atmospheric pressure.

Connected to the extinguishing-agent vessel is a compressed-gas generator, which, in response to being triggered, mixes the extinguishing agent together with the compressed gas and sprays this mixture into the space where the extinguishing is to take place. In order for the extinguishing agent to have a rapid effect, it is more favorable for the extinguishing agent to only be dispersed after it is expelled from the vessel. The shape of the diaphragm used here also does not allow one to compensate for the change in the extinguishing-agent volume as a function of the temperature.

Other extinguishers are known, whose rupture diaphragms are spherically shaped so as to be inwardly concave in the direction of the compressed-gas generator, and are provided with a rupture joint. These rupture diaphragms bulge in response to pressure applied by the gas generator or thermally induced expansion, at some point that, as a rule, is not at the center of the diaphragms, but rather at an arbitrary position on the spherical diaphragm surface. The bulge extends to the other side in the form of an inversion and results in a rupture joint rupturing off-center. This again causes the extinguishing agent to be discharged in a nonuniform manner.

Therefore, the object of the present invention is to improve a rupture diaphragm for an extinguisher of the type mentioned above, so as to eliminate the above-mentioned disadvantages and cause the rupture diaphragm to burst open in the center, and thus uniformly disperse the extinguishing agent.

The object is achieved in a simple manner with the aid of the characterizing features of the main claim, and an advantageous embodiment follows from the features of the dependent claims. The particular advantage of the rupture diaphragm according to the present invention is that the planar surface or the depression in the center of the rupture diaphragm allows the

diaphragm to be easily inverted in the case of pressure being applied, without local bulging occurring. In this context, the rupture diaphragm behaves like a cup spring. In addition, the rupture diaphragm designed according to the present invention can compensate for thermal expansion of the extinguishing agent, since the planar surface or the depression in the center of the diaphragm is elastic in its movement in the axial direction.

A further advantage results from the circular shape of the planar surface in the center of the rupture diaphragm, in that a uniform load distribution is achieved in response to an applied pressure. This in turn supports a uniform inversion of the diaphragms and prevents them from bulging on the side. Finally, the inverting procedure causes the rupture joint provided on the edge of the rupture diaphragm to weaken prior to breaking, so that the actual rupturing event takes place simultaneously on the entire circumference, and the extinguishing agent is expelled in a uniform manner.

An exemplary embodiment is described in detail below and is represented in the drawing in a schematically simplified manner. The figures show:

Fig. 1 the construction type of an extinguisher having concave diaphragms, according to the related art;

Fig. 2 a section of an extinguisher cartridge, having a planar center of the diaphragm;

Fig. 3 a section of an extinguisher cartridge, having a central depression; and

Fig. 4 an inverted rupture diaphragm.

Represented in Fig. 1 is an extinguisher 1, which is constructed in a known manner and contains a pyrotechnic gas

generator 2. Rupture diaphragms 3 and 4, which are concave with respect to pyrotechnic gas generator 2, i.e. curved in the direction of the gas generator, seal extinguishing-agent cartridge 5 so that extinguishing agent 6 cannot escape. Rupture diaphragms 3 and 4 are spherically shaped and have rupture joints in their diaphragm surfaces. In the case of pressure being applied, such rupture diaphragms bulge at some randomly determined point or at a weak point in the material. In the case of a distinct bulge, the nearest rupture joint begins to break.

In order to prevent such an occurrence, the present invention proposes forming the rupture diaphragms in a manner represented in Fig. 2. In this case, the center of rupture diaphragms 7 is in the form of a flat surface. Situated at the edge of rupture diaphragm 7 is rupture joint 8, which is impressed about the circumference. Temperature-dependent volume fluctuations are compensated for with the aid of the central, planar surface, by its elastic movement in the direction of main axis A of extinguisher 1. In the case of compressed-gas generator 2 being triggered, the two diaphragms 7 are simultaneously inverted, and the rupture joints 8 weakened by the inversion pull apart.

In Fig. 3, rupture diaphragms 9 are designed to be convex in their central region, i.e. curved away from the compressed-gas generator. This shape of the diaphragms has a positive effect in centrally focusing the pressure applied by gas generator 2.

Finally, Fig. 4 shows the procedure of inverting the two rupture diaphragms 7 shown in the resting state in Fig. 2, by the action of the applied gas pressure (arrows). During the inversion procedure, rupture joints 8 are first subjected to lateral flexure and then tensile stress. The rupture simultaneously occurs along the rupture line of the two rupture joints 8. The resting position of right rupture diaphragm 7 is represented in Fig. 4, by a dashed line.